	Assiut University – Faculty of Science Physics Department 2023-2024 - 1st semester 23/1/2024	
Material science	Final Exam	Time: 2h

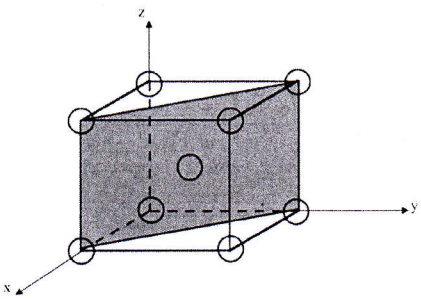
1.6×10^{-19} C	شحنة الالكترون		6.626×10^{-34} Joule. sec	ثابت بلانك
9.1×10^{-31} kg	كتلة الالكترون		3×10^{8} m.sec^{-1}	سرعة الضوء
1.672×10^{-27} kg	كتلة النيوترون		9×10^{9} J.m.C^{-2}	ثابت كولوم
1.602×10^{-19} J	الالكترون فولت		1.097×10^{7} m^{-1}	ثابت رايدبرج

Answer the following questions:

Q1: Circle the correct answer, for the following questions. (24 Marks equally *distributed)*

1. The Miller indices h, k, and l of parallel planes in a BCC lattice should satisfy which of the following X-ray diffraction reflection rules?
   a. h + k + l should be even
   b. h, k, and l should all be either even or odd
   c. h, k, and l should form Pythagoras triplet
   d. all planes allow reflections

2. Miller indices for the indicated plane, below figure, is:



   a. (001)
   b. (110)
   c. (101)
   d. (011)

3. Aluminum has FCC cubic structure of lattice constant a=4.04 angstrom, then the inter planner spacing d100 in Å:
   a. 3.73
   b. 8.18
   c. 8.6
   d. 4.04

4. Representation of family of planes is _____
   a. (h k l)
   b. {h k l}
   c. [h k l]
   d. < h k l >

5. The largest distance between the inter atomic planes of a crystal is 10^{-7}cm. The upper limit for the wavelength of X-rays which can be usefully studied with this crystal is
   a. 1 Å
   b. 2 Å
   c. 10Å
   d. 20 Å

6. X-ray diffraction peaks from powder diffraction experiment for polycrystalline metals with FCC structure can occur from planes with miller indices:
   a. (101)
   b. (111)
   c. (321)